UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

June 6, 2003

Thomas F. Mueller
Corps of Engineers, Seattle District
Regulatory Branch CENWS-OD-RG
Post Office Box 3755
Seattle, Washington 98124-3755

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Dakota Avenue Gateway Marina, Anacortes, Washington Project. (WRIA 3) (NMFS Tracking No. WHB-02-257, COE Number 2001-2-00795).

Dear Mr. Mueller:

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. 1536, and Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C. 1855, as amended by the Sustainable Fisheries Act of 1996, the attached document transmits NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and MSA Essential Fish Habitat (EFH) Consultation. These consultations are based on NOAA Fisheries' review of a proposal to issue a permit for the construction of the Dakota Avenue Gateway Marina in Anacortes, Washington. The Army Corps of Engineers (COE) determined that the proposed action was likely to adversely affect the Puget Sound chinook salmon (*Onchorynchus tshawytscha)* Evolutionarily Significant Unit, and requested formal consultation. NOAA Fisheries concurred with this determination, and initiated formal consultation on December 30, 2002.

This Opinion reflects the results of a formal ESA consultation and contains an analysis of effects covering the above listed species in Guemes Channel, Washington. The Opinion is based on information provided in the Biological Evaluation and addenda, site visit on July 26, 2002, and additional information transmitted via telephone conversations and e-mail. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office.

NOAA Fisheries concludes that implementation of the proposed project is not likely to jeopardize the continued existence of Puget Sound chinook salmon. In your review, please note that the incidental take statement, includes Reasonable and Prudent Measures and Terms and Conditions, designed to minimize take.

The MSA consultation concluded that the proposed project may adversely impact designated EFH for groundfish. Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries has made conservation recommendations intended to minimize the adverse effects of this action to designated EFH.

If you have any questions, please contact Robert Donnelly of the Washington Habitat Branch at (206) 526-6117 or via email at bob.donnelly@noaa.gov.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

cc: Olivia Romano, COE
Ken Berg, USFWS

Endangered Species Act - Section 7 Consultation
And
Magnuson-Stevens Act
Essential Fish Habitat Consultation

BIOLOGICAL OPINION

Dakota Avenue Gateway Marina
Anacortes, Washington
NMFS Tracking No. WHB-02-257

Agency: United States Army Corps of Engineers

Consultation Conducted By: National Marine Fisheries Service,
Northwest Region

Issued by: for Michael R Crouse Date: June 6, 2003

D. Robert Lohn
Regional Administrator

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1.0 INTRODUCTION

The Biological Opinion (Opinion) and Essential Fish Habitat (EFH) consultation contained in this document are based on NOAA's National Marine Fisheries Service's (NOAA Fisheries) review of a proposal by the U.S. Army Corps of Engineers (COE) to issue permits for the Dakota Avenue Gateway Marina, Anacortes, Washington. The project consists of building a new marina, modifying an existing, adjacent, shoreline and constructing an office building/parking garage on the up-land adjacent to the proposed marina. Slips (vessel tie-up locations) in the marina will be sold to individual vessel owners. Each slip is sized to accommodate vessels of 40 to 60 feet in length. The marina will be controlled by an owners' association. The project area is within the Puget Sound chinook salmon (*Onochorynchus tshawytscha)* Evolutionarily Significant Unit (ESU). Puget Sound is also EFH for various life stages of 46 species of groundfish, four species of coastal pelagics, and three species of Pacific salmon.

1.1 Background Information

The demand for marina moorage space in Puget Sound is extremely high, with waiting times for applicants measured in multiple years. As a result, several new marinas, both dryland storage and in-water moorage, have been proposed, along with proposals to expand existing marinas. Recent proposals for new marinas have incorporated fish-friendly features into their designs that minimize damage to habitat. In the Anacortes area there have been at least four proposals to either build new, or remodel existing, marinas. The new marina proposals have incorporated features that are protective of the environment in general and protective of chinook salmon in particular. The nearby San Juan Islands has become an increasingly popular area for pleasure boaters. There are a number of parks in the area that are accessible only by boat and are heavily used during the summer months. Boat owners mooring their vessels at or near Anacortes reduce their overall (boat plus car) travel time to the San Juan Islands by a day or more depending on vessel speed and departure location in central or southern Puget Sound.

1.2 Consultation History

This document is based on information provided in the Biological Evaluation (BE) and the following written correspondence:

- Letter of transmittal for the BE from the COE dated August 1, 2002.
- Site visit on July 26, 2002. Met with the project proponent and Jon Houghton, the project proponent's consultant.
- Email on September 20, 2002, from the consultant that contained additional information necessary for the consultation.
- Request on October 18, 2002, for electronic copies of the BE from Jon Houghton.
- Numerous additional telephone conversations and e-mail correspondence between NOAA Fisheries' staff, COE, the project proponent and Jon Houghton.
- Letter sent on December 30, 2002, to the COE initiating formal consultation.

1.3 Description of the Proposed Action

The proposed project includes the construction of a marina with 40 "condominium" style berths for 40- to 60-foot vessels, eight transient and seasonal berths for yachts up to 150 feet in length, and one 85-foot loading zone slip for an inter-island charter service. The facility will have two 50-foot refueling docks with diesel and unleaded gasoline dispensers. A double-walled, twin-celled 20,000-gallon (i.e., 15,000 gallons diesel and 5,000 gallons unleaded gasoline) aboveground fuel tank with double-wall separation will be contained in a concrete vault on the upland portion of the site. A public-access sewage pump-out service, with attendant, will be available adjacent to the fuel docks, at the charter-service loading zone, and at every other permanent slip. Onshore facilities will include a 1,200-square-foot passenger waiting area for charter-service clients and for the general public. The inter-island charter service currently uses leased facilities at Skyline Marina in Burrows Bay, southwest of the project site.

Construction of the marina facility will include the installation of up to 95 galvanized steel piles. Approximately 32, 24-inch-diameter galvanized steel pilings, installed on 20-foot centers, will be used to secure the main perimeter docks that will also function as wave attenuators. The wave attenuators are intended to prevent damage to moored boats and pier structures due to swells, waves, or vessel wakes. These structures will be 21 feet wide (in plan view) along the off-shore side of the marina. The site is exposed to moderate wind- and current-generated swells from the west, northwest, and north. The perimeter docks and wave attenuators were designed assuming a wave generated by a 50-year wind. The exposed west side will be protected by a 17-foot-wide dock and wave attenuator; a 13-foot-wide dock and wave attenuator "tee" will be positioned on the east side of the marina. A vertical 7-foot "wave fence" will extend beneath the structures on the north and west sides to dissipate wave energy before it enters the mooring basin.

The new floats will use heavy-walled, high-density, rotationally molded polyethylene and/or concrete enclosures for the flotation billets to prevent the release of foam into the environment. The fuel docks will use concrete enclosures. The finger floats will also be constructed of heavy-walled, molded polyethylene-encased foam billets. The finger piers will be approximately 7 feet wide with timber wales used to tie the float sections together. Approximately 36, 16-inch-diameter steel pilings will be used to secure the finger piers. An additional 14, 16-inch-diameter galvanized steel pilings will be used to secure the main piers, which includes the loading zone, and the fuel docks. Two 12-inch-diameter galvanized steel pilings will support a short, fixed pier and a 100-foot-long gangway, which has an 85-foot effective coverage length, that will connect the floating piers to the shoreline. The gangway will include grating that complies with the requirements of the Americans with Disabilities Act. An additional 11, 12-inch-diameter galvanized steel pilings, will be installed as a conservation measure to mark the recommended navigation channel along the north edge of the existing eelgrass bed.

The proposed project will add approximately 38,170 square feet of floating over-water coverage and approximately 160 square feet of fixed-pier over-water structure along the seawall, for a total net increase in over-water coverage of 38,330 square feet.

Float construction work will occur off site, with rafting and hand assembly on site as pile driving is completed. The pile driving will be performed from a derrick barge with an air impact hammer. A boom will be deployed around the construction area to contain any floating debris and construction equipment lubricants that may accidentally enter the water. Any debris that accidentally enters the water will be contained by the floating boom and removed from of the water immediately. Pile driving will take approximately two weeks (i.e., 10 to 14 working days based on an estimated pile-driving rate of from 8 to 10 piles per day). Assembly of the float sections will occur concurrently with pile driving, take approximately one month, and be complete within approximately one week after pile driving is completed. The proposed starting date is as soon as possible after the appropriate "fish window" opens.

An existing seawall protects the western portion of the shoreline of the project site. Originally constructed in 1907, the seawall is badly deteriorated below the ordinary high water (OHW) mark (9.65 feet above Mean Lower Low Water (MLLW)). Approximately 600 cubic yards of riprap and clean structural fill will be placed along the toe of the existing vertical bulkhead to provide needed support and protection. The riprap will be placed at a slope of 1.5 units horizontal to 1 unit vertical (1.5 to 1) from approximately MLLW to plus 7.6 feet MLLW. The placement of fill and additional riprap will occur during low tides to minimize water quality impacts. All of the seawall repair work will be done during the allowed fish window to minimize impacts on migrating juvenile salmonids.

The remaining shoreline east of the seawall is partially armored with riprap consisting of concrete rubble and large granite boulders. The riprap does not adequately protect the bank from being undermined or from sloughing above OHW. A vinyl sheet-pile bulkhead will be installed behind the existing top of the bank to prevent continued erosion. Broken concrete rubble in the intertidal zone will be removed and replaced with a layer of rocks and cobbles consistent with the existing character of the beach. Scattered 6- to 8-inch cobbles will be placed over disturbed portions of the beach to mimic the existing mixed-fine habitat. The beach contours below plus 6.0 feet MLLW will be maintained. The existing riprap coverage along the eastern portion of the shoreline is more extensive. The existing riprap slope will be repaired or maintained above OHW and a habitat fill of minus 2-inch mixed sand and gravel will be applied across the entire riprap slope. Anchored drift logs and suitable riparian vegetation will be planted along the base of the vinyl sheet-pile bulkhead and between the top of the bank and the proposed public access footpath.

Shore facilities will include two levels of covered parking, with a two-story office building for water-dependent and water-oriented businesses on the upper level. Maximum building height will be approximately 50 feet above ground level (approximately plus 15 feet MLLW at the building site). The building footprint will be 27,810 square feet, including 15,380 square feet of covered parking. An access road and outside parking area will cover an additional 14,900 square feet. Surface-water runoff from parking lots and road surfaces will be collected in catch basins and directed to a water quality vault for treatment. Treatment will include sediment filtration and oil-water separation in the vault. Treated runoff will be discharged to a City of Anacortes outfall that will discharge into a deep catch basin to dissipate energy then onto the riprap slope in the upper intertidal zone. Roof runoff, which does not require treatment, will be collected and routed to a separate outfall located near the site of the existing City of Anacortes outfall at the western end of the proposed sheet pile wall.

All Washington State Department of Ecology (WDOE) required best management practices (BMPs) and spill controls will be used during construction to minimize the possibility of petroleum product and construction debris releases. No in-water construction will take place during salmon migration/rearing periods as stipulated by the Washington Department of Fish and Wildlife (WDFW). Once marina construction is complete, all WDOE required BMPs and spill control procedures will be followed during marina operations. Trained personnel will staff the fuel concession operation and will have access to the required spill containment equipment. A spill response plan will be drafted and implemented in the event of a spill during fueling or other marina operations. The public access sewage pump-out service at the fuel dock will also be staffed by trained personnel. Because there is a potential that the shading created by the new floats may result in decreased productivity of macrovegetation at the marina site, the project includes a vegetation enhancement program to be initiated upon receipt of project permits. This vegetation enhancement program will have three elements described in detail in the Monitoring and Conservation Plan (Appendix A): Kelp substratum enhancement; Marsh vegetation enhancement; and Riparian vegetation enhancement. Other BMPs to be instituted include:

- Avoid in-water work between March 15 and July 15 during salmon nearshore habitat use.
- Avoid setting anchors in eelgrass or kelp.
- Provide erosion control through use of BMPs such as barrier berms, silt fences, and sediment ponds.
- Cover exposed soil with mulch, seed, or plastic cover or bonded fiber mats to minimize the extent and duration of exposure by wind and rainfall.
- Implement spill control measures at each construction site to keep uncontrolled release of fuels and other construction materials from entering downstream receiving waters through storm-water runoff.
- Handle hazardous materials in a manner that minimizes the risk to aquatic and riparian habitats.

1.4 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area for this Marina project is the Guemes Channel, between Guemes Island to the north and Fidalgo Island to the south. It extends from Cap Sante Point in the east to Shannon Point in the west. Other areas included are roads leading to and from the site, facilities used by the contractors, facilities used by suppliers of material supporting the construction and operation (e.g. fuel vendors), and repair facilities used by vessel owners that use the marina.

The proposed marina is to be located at 1100 Dakota Avenue, Anacortes, Skagit County, Washington (Section 23 of Township 35N, Range 01E). The location is on the south shore of

Guemes Channel approximately 1.5 miles west southwest of the Anacortes central business district. The project site is the former location of a fish cannery operation. The cannery facilities, including onshore processing facilities and a dock, burned in July 1993 and were subsequently demolished. A seawall constructed in 1907 exists at the site. The remaining shoreline east of the seawall is partially armored with riprap consisting of concrete rubble and large granite boulders.

2.0 ENDANGERED SPECIES ACT

2.1 Biological Opinion

The purpose of consultation under the Endangered Species Act (the Act) is to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of threatened or endangered species, or result in the adverse modification of designated critical habitat. Formal consultation concludes with the issuance of a biological opinion under section 7(b)(3) of the Act.

2.1.1 Evaluating the proposed action

The standards for determining jeopardy, as set forth in Section 7(a)(2) of the Act, are defined at 50 CFR 402. NOAA Fisheries must determine whether the action is likely to jeopardize the continued existence of listed species. This analysis involves the initial steps of (1) defining the biological requirements of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of injury and mortality attributed to: (1) collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life stages that occur beyond the action area.

2.1.1.1 Biological Requirements

The relevant biological requirements are those conditions necessary for Puget Sound chinook salmon ESU to survive and recover to naturally reproducing population levels, at which time protection under the Act would become unnecessary. For the purposes of conservation under the Act, an ESU is a distinct population segment that is substantially isolated, reproductively, from other conspecific population units and represents an important component in the evolutionary legacy of the species (Waples 1991). Adequate population levels must safeguard the genetic diversity of the listed stocks, enhance the species' capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment. Specific information related to the biological requirements for Puget Sound chinook salmon can be found in Myers, *et al.* (1998) and Busby *et al*. (1996).

Biological requirements are generally defined as properly functioning habitat relevant to each life history stage of chinook salmon. In addition, there must be enough of the properly functioning habitat to ensure the continued existence and recovery of the ESU. The specific Puget Sound chinook salmon habitats that are likely to be affected by this project are near-shore and intertidal areas in marine waters.

2.1.1.2 Environmental Baseline

The environmental baseline represents the current set of conditions, to which the effects of the proposed action will be added. Environmental baseline is defined as "the past and present impacts of all Federal, State, and private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or informal section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process" (50 CFR 402.02).

The majority of land surrounding Puget Sound, including the action area, is composed of glacial deposits, sometimes referred to as glacial till. Under natural conditions material sloughs off via landslides, bringing material ranging in size from boulders to clay, entire trees, and other vegetation onto beaches. With development upland and armoring of the adjacent shoreline to protect the development, this process has been disrupted, preventing material from reaching the shore in much of the Puget Sound Basin (Downing 1983).

A functioning intertidal/nearshore area provides several important ecological functions, which directly and indirectly support juvenile and adult salmonids. These functions include primary production (the basis of food production for chinook salmon), refuge from predation, forage area, and migration corridor. The most dense concentrations of juvenile chinook salmon have been found in shallow nearshore habitats as they move and feed along shorelines (City of Seattle, 2001). Juvenile chinook salmon are vulnerable to predation from both birds and other fish and need habitat that provides refuge at all tidal stages. Nearshore habitats also provide spawning areas for forage fish including herring (*Clupea harengus pallasi*), sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesis pretiosus pretiosus*), which are important food sources for adult and sub-adult chinook salmon (City of Seattle 2001). Herring spawn in eelgrass (*Zostera marina*) beds, which grow in the lower intertidal and shallow subtidal zone (plus 3 feet to minus 15 feet MLLW). Eelgrass provides numerous habitat functions for juvenile salmon (such as a refuge and feeding) and many other species as well. Sand lance and surf smelt spawn on sand and gravel beaches in the upper intertidal zone (plus 4.5 feet to the Mean Higher High Water (MHHW) Line).

Shallow, productive, gently sloped intertidal area is extremely important to juvenile chinook salmon as necessary habitat for maximum survival of the ESU. Degradation of this habitat has probably been an important contributing factor in the decline of the Puget Sound chinook ESU.

The degradation has come about gradually over many years, as development occurred. The beaches have slowly changed from the soft substrate habitat preferred by juvenile chinook salmon to a hard substrate habitat of less value, as material was removed through natural processes from the beaches (and not replaced) and erosion ate away at the toe of the shore armor (Downing 1983). If the degraded intertidal is not somehow "repaired" the abundance of chinook salmon will most likely remain depressed.

Most of the southern shore of Guemes Channel has been armored with rock or riprap, however, sections of the riparian zone is still heavily forested. In the proposed marina area, a seawall of approximately 150 feet creates a vertical shoreline and prevents shoreline processes from replenishing the intertidal area. The remaining shoreline east of the seawall is partially armored with riprap consisting of concrete rubble and large granite boulders, which also significantly disrupts shoreline processes. Similar to the remainder of Guemes Channel, portions the riparian zone within the action area are forested, and portions are in open grass.

2.1.1.3 Status of the Listed Species

Chinook salmon are the largest of the Pacific salmon (Netboy 1958), and arguably exhibit the most diverse and complex life history strategies of all salmonids. Healey (1986) described 16 age categories for chinook salmon, seven total ages with three possible freshwater ages. Two generalized freshwater life-history types were initially described by Gilbert (1912): "stream-type" chinook salmon that reside in freshwater for a year or more following emergence, and "ocean-type" chinook salmon that migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for "ocean-type" and "stream-type" to describe two distinct races of chinook salmon. This racial approach incorporates life history traits, geographic distribution, genetic differentiation, and provides a valuable frame of reference for comparisons of chinook salmon populations. The generalized life history of chinook salmon involves incubation, hatching, and emergence in freshwater, migration to the ocean, and subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. Some male chinook salmon mature in freshwater, thereby foregoing emigration to the ocean.

The Puget Sound ESU is comprised of 31 historically quasi-independent populations of chinook salmon, of which 22 are believed to be extant (PSTRT 2001 and 2002). The populations that are presumed to be extirpated were mostly of early-returning fish, and most of these were in the mid- to southern parts of Puget Sound, Hood Canal and the Strait of Juan de Fuca. This ESU encompasses all runs of chinook salmon in the Puget Sound region from the North Fork Nooksack River to the Elwha River on the Olympic Peninsula. Chinook salmon are found in most of the rivers in this region. The boundaries of the Puget Sound ESU correspond generally with the boundaries of the Puget Lowland Ecoregion. Despite being in the rain-shadow of the Olympic Mountains, the river systems in this area maintain high flow rates due to the melting snowpack in the surrounding mountains. Temperatures tend to be moderated by the marine environment. The Elwha River, which is in the Coastal Ecoregion, is the only system in this ESU which lies outside the Puget Sound Ecoregion.

Chinook salmon in this area all exhibit an ocean-type life history. Although some spring-run chinook salmon populations in the Puget Sound ESU have a high proportion of yearling smolt emigrants, the proportion varies from year to year and appears to be environmentally mediated rather than genetically determined. Puget Sound stocks all tend to mature at ages three and four and exhibit similar, coastally-oriented, ocean migration patterns.

The most recent 5-year geometric mean natural spawner numbers in populations of Puget Sound chinook range from 42 to just over 7,000 fish. Most populations contain natural spawners numbering in the hundreds (median recent natural escapement equals 481), and of the six populations with greater than 1,000 natural spawners, only two are thought to have a low fraction of hatchery fish. Estimates of historical equilibrium abundance from pre-European settlement habitat conditions range from 1,700 to 51,000 potential chinook spawners per population. The historical estimates of spawner capacity are several orders of magnitude higher than realized spawner abundances currently observed throughout the ESU.

Previous assessments of stocks within this ESU have identified several stocks as being "at risk" or "of concern." Long-term trends in abundance and median population growth rates for naturally spawning populations of chinook salmon in Puget Sound indicate that approximately half of the populations are declining and half are increasing in abundance over the length of available time series. Eight of 22 populations have declining abundance over the short term, similar to long-term trends that show 11-12 populations declining.

Factors for decline include anthropogenic activities which have blocked or reduced access to historical spawning grounds and altered downstream flow and thermal conditions. In general, upper tributaries have been impacted by forest practices while lower tributaries and mainstem rivers have been impacted by agriculture and/or urbanization. Diking for flood control, draining and filling of freshwater and estuarine wetlands, and sedimentation due to forest practices and urban development are cited as problems throughout the ESU (WDF *et al*. 1993). Blockages by dams, water diversions, and shifts in flow regime due to hydroelectric development and flood control projects are major habitat problems in several basins. Bishop and Morgan (1996) identified a variety of critical habitat issues for streams in the range of this ESU including: (1) changes in flow regime (all basins); (2) sedimentation (all basins); (3) high temperatures in some stream; (4) streambed instability; (5) estuarine loss; (6) loss of large woody debris in some streams; (7) loss of pool habitat in some streams; (8) blockage or passage problems associated with dams or other structures; and 9) decreased gravel recruitment. These impacts on the spawning and rearing environment may also have had an impact on the expression of many life-history traits and masked or exaggerated the distinctiveness of many stocks. The Puget Sound Salmon Stock Review Group (PFMC 1997) concluded that reductions in habitat capacity and quality have contributed to escapement problems for Puget Sound chinook salmon. It cited evidence of direct losses of tributary and mainstem habitat due to: (1) dams; (2) loss of slough and side-channel habitat caused by diking, dredging, and hydromodification; and (3) reductions in habitat quality due to land management activities.

The artificial propagation of fall-run stocks is widespread throughout this region. Summer/fall chinook salmon transfers between watersheds within and outside the region have been commonplace throughout this century; thus, the purity of naturally spawning stocks varies from river to river. Nearly two billion chinook salmon have been released into Puget Sound tributaries since the 1950s. The vast majority of these have been derived from local returning fall-run adults. Returns to hatcheries have accounted for 57% of the total spawning escapement, although the hatchery contribution to spawner escapement is probably much higher due to hatchery-derived strays on the spawning grounds. The electrophoretic similarity between Green River fall-run chinook salmon and several other fall-run stocks in Puget Sound (Marshall *et al*. 1995) suggests that there may have been a significant and lasting effect from some hatchery transplants. Overall, the pervasive use of Green River stock throughout much of the extensive hatchery network in the geographic range of this ESU, may reduce the genetic diversity and fitness of naturally spawning populations.

Nehlsen *et al*. (1991) identified four stocks as extinct, four stocks as possibly extinct, six stocks as at high risk of extinction, one stock as at moderate risk, and one stock of special concern. Harvest impacts on Puget Sound chinook salmon populations averaged 75% (median equals 85%; range 31-92%) in the earliest 5 years of data availability and have dropped to an average of 44% (median equals 45%; range 26-63%) in the most recent 5-year period.

Overall abundance of chinook salmon in this ESU has declined substantially from historical levels, and many populations are small enough that genetic and demographic risks are likely to be relatively high. Both long- and short-term trends in abundance are predominantly downward, and several populations are exhibiting severe short-term declines. Spring-run chinook salmon populations throughout this ESU are all depressed.

Other concerns noted by the Biological Review Team (BRT) are the concentration of the majority of natural production in just two basins, high levels of hatchery production in many areas of the ESU, and widespread loss of estuary and lower floodplain habitat diversity and, likely, associated life history types. Populations in this ESU have not experienced the sharp increases in the late 1990's seen in many other ESUs, though more populations have increased than decreased since the last BRT assessment. After adjusting for changes in harvest rates, however, trends in productivity are less favorable. Most populations are relatively small, and recent abundance within the ESU is only a small fraction of estimated historic run size.

2.1.1.4 Status of the Species within the Action Area

Most of the chinook salmon in the action area are probably from the Nooksack, Samish and Skagit rivers. The 5-year geometric mean of spawning escapement of natural chinook salmon runs in North Puget Sound during the period from 1992-1996 was approximately 13,000. Both long- and short-term trends for these runs were negative, with few exceptions.

Habitat in the Nooksack, Samish and Skagit rivers has been blocked or degraded. In general, upper tributaries have been impacted by forest practices and lower tributaries and mainstem rivers have been impacted primarily by agriculture. Diking for flood control, draining and filling of freshwater and estuarine wetlands, and sedimentation due to forest practices and urban development are cited as problems (WDF *et al*. 1993). Blockages by dams, water diversions, and shifts in flow regime due to hydroelectric development and flood control projects are major habitat problems. Other habitat conncerns include high temperatures, streambed instability, estuarine loss, loss of pool habitat (Bishop and Morgan 1996).

Estimates of the hatchery fraction of natural spawners come from counts of otolith-marked local hatchery fish sampled from carcasses (Nooksack River Basin), and adipose fin clip counts from redd count surveys (Skagit River Basin). In general, populations in the Skagit river basin are the only ones with presumed low estimates of naturally spawning hatchery fish.

In those cases where hatchery information is available (e.g., North Fork Nooksack), the effect of the reproductive success of hatchery fish on abundance trends is dramatic. The most extreme declines in natural spawning abundance have occurred in the North Fork Nooksack over the long term. This populations likely has a moderate to high fraction of naturally spawning hatchery fish. The population with the greatest long-term population growth rate is the Upper Cascade which likely has a low fraction of naturally spawning hatchery fish. The Upper Skagit population has a short-term positive trend in abundance and is thought to have a low fraction of naturally spawning hatchery fish.

Harvest rates on Nooksack and Skagit river populations averaged 75% in the earliest 5 years of data availability and dropped to an average of 47.5% in the most recent 5-year period.

2.1.1.5 Relevance of Baseline to Status of the Species

Presently, the biological requirements of Puget Sound chinook species are not being met under the environmental baseline. The factors for decline that contributed to the need for listing the ESU continue to be present in the action area. As a general matter, to improve the status of the listed species, significant improvements in the habitat conditions are needed. Improving floodplain habitat, restoring saltmarsh habitat and distributary channels in the estuary, removing shoreline armor, eliminating barriers to fish passage, and riparian restoration are all items that could enhance salmonid production in the basin.

2.1.2 Effects of the proposed action

The ESA implementing regulations define “effects of the action” as “the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline.” (50 CFR 402.02). These effects, when added to the effects on listed species from the baseline condition, and cumulative effects, are analyzed to determine whether or not a project will jeopardize the continued existence of a listed species.

2.1.2.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated actions and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated.

The marina site is many miles from the nearest rivers containing spawning chinook salmon. Probable sources of chinook salmon found at the marina site include the Nooksack, Samish and Skagit rivers. Other rivers such as the Snohomish River may be the source of some chinook salmon, but probably contribute only small numbers of individuals. Object oriented (shoreline dependent) juvenile chinook salmon may be present along the shoreline of Guemes Channel in the spring; however, by mid-July juvenile chinook salmon have generally grown to a size where they are not dependent on the shallow water habitat associated with intertidal waters. Potential effects to individual chinook salmon from the proposed project are related to noise disturbance from in-water construction activities, loss of nearshore foraging and rearing habitat, and temporary changes in water quality (e.g., turbidity, erosion, sedimentation, release of pollutants) during construction. Any direct impact to individuals will be limited to those fish that may pass through the area, or are displaced from the project area, during construction. The effects on adult chinook salmon are negligible because fish in this life history stage are highly mobile and are expected to avoid the area during construction.

The nearshore habitat at the marina site will be improved over the long term as a result of marina construction. The lower portion of the vertical concrete bulkhead will be converted from vertical to a 1.5 to 1 slope by filling with rock. The existing riprap armored shore (east of the vertical concrete bulkhead) in the project area will be stabilized and the interstices filled with gravel (2-inch minus) which will greatly reduce the possibility of predators hiding along that portion of the shore. In addition, logs will be anchored in place at the top of the riprap slopes that should provide nutrients and habitat for small crustaceans that are food for juvenile chinook salmon. The upland adjacent to the shore will be enhanced by the planting of native conifers and shrubs which will overhang the water and provide a food source (insects) for the juvenile chinook salmon and nutrient (detritus) for the near-shore food web.

Temporary increases in turbidity could occur during construction. However, in-water construction will occur when juvenile and adult chinook salmon are not expected to be in nearshore areas, reducing the likelihood of fish exposure to turbid conditions. Implementation of the BMPs will reduce the likelihood for significant increases in turbidity, meaning that turbid conditions will be of sufficiently short duration and concentration to have minimal impact to fish. In addition, the act of driving steel piling will cause the emission of a sharp spike in sound, vibration/concussion to water column and ground, and a disturbance to the ground where the pile enters the sediment; the ground disturbance can cause localized increases in turbidity, depending on composition of the substrate (the finer the material, the greater the likelihood material becoming suspended in the water column). Fish that are present during the construction period will not be near-shore dependent, therefore can avoid areas of increased turbidity. To the degree that fish do not avoid the project area, concentrations of suspended sediment are likely to be below levels that cause harm.

Sounds emitted from pile driving, however, have noticeable effects on salmonids. Feist *et al*. (1992) found sound pressure levels (SPL) measured at 600 meters from the point of impact were within the hearing range reported for Atlantic salmon. However, the study did not specify at what distances salmonids reacted negatively to the sounds. The effects are more intense closer to the source and the assumption is that fish are more affected at closer distances. Feist et al. (1992) concluded that salmonids demonstrate avoidance behavior, because twice as many salmonids were observed in the study area on non-pile driving days compared to days with pile driving. However, Carlson, et al. (2001) suggested that due to the characteristics of the sounds produced by pile driving, avoidance responses by fishes are not expected. This lack of avoidance results in prolonged exposure to potentially harmful sound, as has been demonstrated for Atlantic salmon (Dolat 1997). The extreme SPL produced during pile driving activity has been shown to kill several species of fishes. Washington State Ferries recently observed fish kills during impact pile driving activities in the nearshore marine environment (Sasha Visconty, unpublished field notes 2001, John Stadler personal observation 2002). Autopsies of dead juvenile striped surfperch (*Embiotoca lateralis*) revealed that swim bladders were ruptured (Sasha Visconty, pers. comm., Stadler personal observation 2002). California Department of Transportation (Caltrans) reported a fish kill caused by impact pile driving during the Benicia Bridge project in San Francisco Bay (Holstege 2002). Holstege (2002) also cited a pile driving study in which dead anchovies, herrings, sardines and various perch, most within 100 feet of the construction barge, but some as far as 500 feet away, were documented.

The swimbladder, the gas-filled organ that permits most pelagic fish to maintain neutral buoyancy, is vulnerable to abrupt spikes in pressure. The kidney, liver, spleen, and sinus venous also may rupture and hemorrhage. Damage to the auditory system of fishes can occur at sound levels that are lower than those associated with more serious harm, such as incapacitation or rupture of the swimbladder (Dolat 1997). Popper and Clark (1976) demonstrated that SPL as low as 149 decibels (dB) (re: 1 μPa) (All dB measurements throughout this document refer to 1 μPa) are sufficient to produce a temporary threshold shift in the hearing sensitivity of the goldfish (*Carassius auratus*). The degree of damage is related to type, size and pattern of the disturbance, distance from the point of disruption, water depth, species, size, and life history stage of fish. Carlson (1997) recorded measurements during impact pile driving on wooden piles ranging from 160.8 dB (0.11 kPa) and 195.5 dB (6 kPa). Feist et al. (1992) reported observations based on pressure measurements in similar ranges from hollow concrete piles. Measurements from impact pile driving on steel piles during the Riverside Bridge Project in the Skagit River ranged from 191.1 to 212.4 dB (3.6 to 41.5 kPa) (Widener 2002). The Benicia Bridge project generated a pressure change of over 200 kPa which resulted in instantaneous death to fish in the area. NOAA Fisheries (John Stadler, per. comm. 2002) considers root-mean-squared SPLs of 150 dB (0.03 kPa) at a distance of 10 as the threshold for behavioral modification, and peak SPLs of 180 dB (1 kPa) the threshold for physical harm.

Pile driving will occur only after July 16 and before March 14 to avoid juvenile chinook salmon. Adult chinook salmon are likely to be present in the action area during part of the construction. Because the larger adult chinook salmon are likely to tolerate pressure changes better than juveniles, fewer of them will be present in the action area during the construction period, and those that are present are better able to avoid the project site, pile driving is not likely to harm the migrating adults. Widespread fish kills, like those reported in the Benicia Bridge project, are not expected during this proposed action, because the size of the hammer used in this proposed action will be much smaller than that used in the Benicia Bridge project, and sediments in the marina area are silty, not rocky, as was the case in the Benicia Bridge project.

2.1.2.2 Indirect Effects

Indirect effects are those that are caused by the proposed action, are later in time, but are still reasonably certain to occur (50 CFR 402.02). Long-term effects include degradation in water quality associated with the marina, and both a temporary loss of prey from pile driving, and possible permanent, indirect loss of prey resulting from shading.

The occasional spill of petroleum products, "gray" water from moored vessels, or deleterious material from the marina structures and vessels in the marina might degrade water quality around the marina. Water quality degradation from these potential causes will be minimized or avoided through BMPs when the marina becomes operational. To minimize the possibility of water pollution from marina operations, spill prevention and control, trained personnel at the fueling and waste pump-out facility, and waste pump-out receptacles at each privately owned slip will be available in the marina.

The potential for water quality degradation at the marina from upland sources increases as more impervious surface is added to the watershed, changes in water quality and hydrology that affect salmonid species are more easily detected. However, the effects of added impervious surface in a watershed can be addressed in a variety of ways, including the treatment of stormwater delivered across the impervious area. Storm-water treatment facilities and other techniques can reduce those changes in water quality and quantity if they are designed with the project. In the current proposal, effects of the additional impervious surface will be minimized by the storm-water treatment facilities designed into this project. The water quality treatment will remove pollutants and fine sediments from stormwater before they are discharged into Guemes Channel. The changes in the amount or timing of stormwater entering the action area as a result of this project will have an insignificant effect to the receiving water body.

Prey species (forage fish) may be affected, perhaps even killed, due to pile driving. The exact number of individual prey fish killed is difficult to estimate due to several variables, including the density of the substrate at the project site; the sound absorbing qualities of the substrate; the sound absorbing qualities of the adjacent shoreline and brake-water of the adjacent marina; and the likelihood that forage fish will be within impact range of the pile driving activities are all unknown. Based on experience of the impacts of underwater explosives (Robert Donnelly personal observation of underwater explosives, 2001) NOAA Fisheries would expect that fewer than 1,000 dead or injured forage fish will be located in the surface waters of the project area. This loss of forage fish may temporarily reduce available food source to Puget Sound chinook, but the effect of this reduction on chinook is difficult to determine, and is related to the number, age, and distribution of chinook present within the action area.

The prey base of juvenile chinook (e.g. Calanoid copepods) may, over time, be permanently reduced via a reduction in phytoplankton production from the 38,330 square feet of over-water coverage (and unquantified over-water coverage from moored vessels). The new structures will create permanent shading. Because light is necessary for primary production, primary production will be eliminated below some or all of the floating marina structures and moored vessels. There may be less prey for juvenile salmon, and the salmon that are seeking prey in that area will also have reduced feeding effectiveness because salmon are visually oriented predators, and the shading interferes with their visual acuity. The permanent loss of primary production, though small, coupled with reduced feeding effectiveness may result in reduced growth rate of juvenile Puget Sound chinook foraging in the action area.

2.1.3 Cumulative Effects

Cumulative effects are defined as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The action area for this project includes the City of Anacortes that contains a major east-west corridor connecting Interstate 5 with the Anacortes Ferry Terminal (providing Ferry access to and from the United States San Juan Islands). The general region is developing, especially along the water. Riparian vegetation within the action area is a mix of not properly functioning habitat that has little woody vegetation, with portions that are heavily vegetated with large conifers.

Population growth and urban development in Anacortes is expected to continue. While the proposed project may influence the rate or pattern of anticipated future development, it would be difficult to isolate the amount of development facilitated by the proposed marina from that which would occur without the project, as the relationship between boat ownership, water access, and adjacent upland development is complex. The proposed project does improve existing infrastructure which is currently inadequate to support the levels of service necessary for the expected future development. New upland development, and the infrastructure necessary to support it, is expected to occur in much the same manner as in the past. Therefore the anthropogenic sources of habitat degradation that have been identified as factors for decline of Puget Sound chinook are expected to increase and intensify over time in the action area.

2.1.4 Conclusion

The effects of the proposed action, when taken together with effects of the baseline condition and cumulative effects, are not likely to jeopardize the continued existence of the ESU. The project will improve over the existing baseline in three ways: (1) enhancing much of the riparian area on the project property, including planting of large conifers, will improve shallow water, nearshore conditions for juvenile chinook; (2) converting a vertical concrete wall to a 1.5:1 rock bulkhead will increase the amount of intertidal substrate; and (3) filling the interstices of the riprap bulkhead (waterward of and east of the vertical cement bulkhead), with the smallest rock consistent with stability will reduce the probability of predation on juvenile chinook salmon. The no jeopardy determination is also based the on exposure of Puget Sound chinook to deleterious habitat conditions being minimized by: (1) in-water construction timing restrictions; (2) installation of stormwater facilities; (3) the marina's implementation of a spill prevention plan; and (4) the marina staffing of the fuel and pump-out facilities with trained personnel. Overall, the proposed activities are not expected to appreciably reduce the likelihood of survival and recovery of the Puget Sound ESU.

2.1.5 Reinitiation of Consultation

Consultation must be reinitiated if the amount or extent of take specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action (50 CFR §402.16).

2.2 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined as significant habitat modification or degradation that results in death or injury to listed species by "significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering" (50 CFR § 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such takings is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the effects of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize take and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of Anticipated Take

The probability is high that some individual juvenile chinook salmon will be in the action area during pile driving. A subset of these individuals is likely to be in the project area during pile driving. The exact number is unknown, however, despite all available commercial and scientific data, because the fish that would be encountered in the action area constantly moving in search of food, thus the abundance of listed fish in the project area is continually in flux. Take of a limited number juvenile chinook salmon, in the form of death or injury from pile driving, is reasonably certain to occur. Relative to juveniles there will be considerably fewer adult Puget Sound chinook in the area during pile driving, and they are also more able to tolerate pressure changes from pile driving, therefore injury and death of adult chinook is not likely to occur.

Harm in the form of habitat degradation is also likely to occur. There is likely to be a minor reduction in primary production due to overwater coverage afforded by the existence of the marina. This reduction in primary production will reduce the availability of food for chinook salmon. Taken as a whole, and assuming 38,330 square feet of over-water cover, the water beneath will be in permanent shade that will suppress primary production, and the shade will interfere with feeding behavior. The impact will be a reduction to primary production and diminished feeding success in less than 0.001 percent the action area. Thus the amount of take anticipated by this Opinion is that which would result from the loss of 1,000 forage fish and from shading of less than 0.001 percent in primary production.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize incidental take of Puget Sound chinook salmon during construction of the marina. These RPMs are promulgated to reduce impacts to forage fish species, juvenile chinook, and chinook salmon aquatic habitat, and to ensure that the project enhancements meet expectations:

1. The COE shall minimize take associated with pile driving.
2. The COE shall minimize take associated with removal of vegetation.

2.2.3 Terms and conditions

To comply with ESA section 7 and be exempt from the prohibitions of ESA section 9, the COE must comply with the terms and conditions that implement the reasonable and prudent measures. There terms and conditions are non-discretionary.

1. To implement RPM No. 1 above, the COE shall ensure that a fisheries biologist is present at the construction site if impact pile driving is used to install piles. The fisheries biologist shall hydroacoustically monitor the sound pressure levels in the water column during pile driving. The hydroacoustic monitoring shall consist of:

- Underwater SPLs from the first five piles shall be monitored with a hydrophone located at mid-depth and 10 meter distance from the pile being driven. If root-mean-squared (rms) SPLs do not exceed 150 dB (re: 1µPa), and peak SPLs never exceed 180 dB (re: 1µPa), no additional hydroacoustic monitoring is needed as pile driving continues. The energy to drive the first five piles shall be representative of the maximum energy used on the subsequent piles. If rms SPLs exceed 150 dB (re: 1µPa) for fewer than 50% of the impacts, and peak SPLs do not exceed 180 dB (re: 1µPa) during the first five piles, pile driving may continue along with continued hydroacoustic monitoring or, at COE's option, pile driving may continue without hydroacoustic monitoring with the use of an appropriate sound attenuation minimization measure as discussed below. If rms SPLs exceed 150 dB for 50% or more of the impacts, or peak SPLs ever exceed 180 dB (re: 1µPa), pile driving may only continue with the use of an appropriate sound attenuation minimization measure as discussed below. The COE shall notify NOAA Fisheries of the hydroacoustic monitoring from the first five piles within 72 hours.

- Based on the outcome of the above described hydroacoustic monitoring, an appropriate sound attenuation minimization measure, such as one of the following, shall be employed. Methods to minimize the underwater sound pressure level may include reducing the force of each strike, or attenuating the underwater sound by enclosing the pile in an air bubble curtain.

- A report shall be submitted to NOAA Fisheries within 30 days of completion of the project that presents the results of the hydroacoustic monitoring conducted during the project. The following data shall be provided in the report: size and type of pile; approximate energy supplied to the pile; frequency and amplitude of the underwater sound; angle of the pile; water depth, distance from shore or bulkhead; and type and depth of substrate.

2. To implement RPM No. 2 above, the COE shall ensure the applicant implements a monitoring plan that is adequate to detect changes to aquatic and terrestrial plant communities within the marina property.

2.3 Conservation Measures

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information.

The NOAA fisheries recommends that the following conservation measures be implemented, after discussing the proposed project with the COE and the project proponent:

1. The draft Dakota Avenue Gateway Marina Environmental Rules and Regulations should become recorded as deed restrictions that run with the property.

2. NOAA Fisheries should be kept informed if significant amounts of material (debris or liquid discharge from vessels in the Marina) enter waters of the state.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION MANAGEMENT ACT

3.1 Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or state activity that may adversely affect EFH (§305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations (§305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Esential Fish Habitat consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. Designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 1999).

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Casillas et al. (1998) provides additional detail on the groundfish EFH habitat complexes. Assessment of the potential adverse effects to these species' EFH from the proposed action is based, in part, on these descriptions and on information provided by the COE.

3.3 Proposed Actions

The proposed action and action area are detailed above in Sections 1.3 and 1.4 of this document, pages two through five of the BE, and pages one and two of the Essential Fish Habitat Assessment (BA, Appendix C). The action area includes habitats that have been designated as EFH for various life-history stages of 46 species of groundfish, four species of coastal pelagics, and three species of Pacific salmon.

Table 1. Species of fishes with designated EFH occurring in Puget Sound.

Groundfish Species	redstripe rockfish *S. proriger*	Dover sole *Microstomus pacificus*
spiny dogfish *Squalus acanthias*	rosethorn rockfish *S. helvomaculatus*	English sole *Parophrys vetulus*
big skate *Raja binoculata*	rosy rockfish *S. rosaceus*	flathead sole *Hippoglossoides elassodon*
California skate *Raja inornata*	rougheye rockfish *S. aleutianus*	petrale sole *Eopsetta jordani*
longnose skate *Raja rhina*	sharpchin rockfish *S. zacentrus*	rex sole *Glyptocephalus zachirus*
ratfish *Hydrolagus colliei*	splitnose rockfish *S. diploproa*	rock sole *Lepidopsetta bilineata*
Pacific cod *Gadus macrocephalus*	striptail rockfish *S. saxicola*	sand sole *Psettichthys melanostictus*
Pacific whiting (hake) *Merluccius productus*	tiger rockfish *S. nigrocinctus*	starry flounder *Platichthys stellatus*
black rockfish *Sebastes melanops*	vermilion rockfish *S. miniatus*	arrowtooth flounder *Atheresthes stomias*
bocaccio *S. paucispinis*	yelloweye rockfish *S. ruberrimus*	
brown rockfish *S. auriculatus*	yellowtail rockfish *S. flavidus*	**Coastal Pelagic Species**
canary rockfish *S. pinniger*	shortspine thornyhead *Sebastolobus alascanus*	anchovy *Engraulis mordax*
China rockfish *S. nebulosus*	cabezon *Scorpaenichthys marmoratus*	Pacific sardine *Sardinops sagax*
copper rockfish *S. caurinus*	lingcod *Ophiodon elongatus*	Pacific mackerel *Scomber japonicus*
darkblotch rockfish *S. crameri*	kelp greenling *Hexagrammos decagrammus*	market squid *Loligo opalescens*
greenstriped rockfish *S. elongatus*	sablefish *Anoplopoma fimbria*	**Pacific Salmon Species**
Pacific ocean perch *S. alutus*	Pacific sanddab *Citharichthys sordidus*	chinook salmon *Oncorhynchus tshawytscha*
quillback rockfish *S. maliger*	butter sole *Isopsetta isolepis*	coho salmon *O. kisutch*
redbanded rockfish *S. babcocki*	curlfin sole *Pleuronichthys decurrens*	Puget Sound pink salmon *O. gorbuscha*

3.4 Effects of Proposed Actions

As described in detail in Sections 2.1.2, 2.1.3 and 2.1.4 of this document, the proposed action may result in detrimental short- and long-term impacts to a variety of habitat parameters. These adverse effects are:

1. Impact driving of steel piles will create intense sound pressure waves that can injure and kill fishes.

2. Potential loss of riparian and aquatic vegetation from construction of the marina.

3. Discharge of petroleum products and other contaminants from vessels may degrade water and sediment quality in the marina.

3.5 Conclusion

NOAA Fisheries believes that the proposed actions may adversely affect the designated EFH for the species is Table 1.

3.6 EFH Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that would adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the COE, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. Consequently, NOAA Fisheries recommends that the COE implement the following conservation measures to minimize the potential adverse effects to EFH for the species in Table 1:

1. To minimize the adverse effects of pile driving the COE should hydroacoustically monitor the underwater sound pressure levels, and implement sound attenuation measures if rms SPLs exceed 150dB for greater than 50% of the hammer blows, or if peak SPLs ever exceed 180 dB. Recommended monitoring procedures and sound attenuaiton measures are described in Section 2.2.3 of this document.

2. To minimize the adverse effects to aquatic vegetation the COE should ensure the applicant implements a monitoring plan that is adequate to detect changes to aquatic and terrestrial plant communities within the marina property.

3. The draft Dakota Avenue Gateway Marina Environmental Rules and Regulations should become recorded as deed restrictions that run with the property.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

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APPENDIX A

Monitoring and Conservation Plan

Dakota Avenue Gateway Marina

Monitoring and Conservation Plan
Anacortes, Washington

Prepared for
Baraka, LLC

March 4, 2002
12531-01

Dakota Avenue Gateway Marina
Monitoring and Conservation Plan
Anacortes, Washington

Prepared for
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3609 West Third Street
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March 4, 2002
12531-01

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DAKOTA AVENUE GATEWAY MARINA MONITORING AND CONSERVATION PLAN

2. Introduction

2. Project Background

Baraka, LLC, proposes to construct and operate a marina site at the former location of a fish cannery operation along the southwest shoreline of Guemes Channel in Anacortes, Washington (Sheet 1). The cannery facilities, including onshore processing facilities and a dock, burned in July 1993 and were demolished. The proposed project (Sheets 2 through 10) includes the construction of a commercially-oriented marina with 40 “condominium”-style berths for 40- to 60-foot vessels, eight transient and seasonal berths for yachts up to 150 feet in length along the wave attenuator, and one 85-foot loading zone slip for an inter-island charter service (Sheet 2). The facility will have two 50-foot refueling docks with three, two-product (i.e., diesel and unleaded gasoline) and one, one-product (i.e., unleaded gasoline) dispensers. A double-walled, twin-celled 20,000-gallon (i.e., 15,000 gallons diesel and 5,000 gallons unleaded gasoline) above-ground fuel tank with double-wall separation will be contained in a concrete vault on the upland portion of the site. A public-access sewage pump-out service with attendant will be available adjacent to the fuel docks, at the charter-service loading zone, and at every other permanent slip. Onshore facilities will include a 1,200-square foot (sf) passenger waiting area for charter-service clients and for the general public. The inter-island charter service currently uses leased facilities at Skyline Marina in Burrows Bay, south of the project site.

4. Plan Objectives

The objectives of this plan are as follows:

- To evaluate the nature of the littoral (intertidal and shallow subtidal) and deeper marine habitat effects of construction and operation of the proposed marina and associated upland components of the project; emphasis is placed on habitat for salmonids listed or potentially listed as threatened under the Endangered Species Act (ESA) and on marine macrovegetation that may be affected by project shading.

- To describe project enhancement/conservation measures that will be implemented with approval of this plan (i.e., as part of project construction). These actions are expected to more than offset reasonable worst-case estimated loss of marine habitat functions that might result from the project and result in a net gain in littoral and subtidal habitat functions.

- To describe monitoring that will be conducted to document the success of the enhancement/ conservation measures.

Information related to the project description and project impacts that is provided in this plan is derived from the project biological evaluation (BE).

7. Project Summary

2. Marina Facilities

Construction of the marina facility will include the installation of up to 95 galvanized steel piles. Approximately 32, 24-inch-diameter galvanized steel pilings, installed on 20-foot centers, will be used to secure the main perimeter docks that will also function as wave attenuators. Marina operation will require wave attenuators to prevent damage to moored boats and pier structures from swells, waves, or vessel wakes. The site is exposed to moderate wind- and current-generated swells from the west, northwest, and north; the perimeter docks and wave attenuators were designed assuming a wave generated by a 50-year wind. Along the exposed Guemes Channel side of the marina, the north wave attenuator will be 21 feet wide. The exposed west side will be protected by a 17-foot-wide dock and wave attenuator; a 13-foot-wide dock and wave attenuator "tee" will be positioned on the east side of the marina (Sheet 3). A vertical 7-foot "wave fence" (Sheet 6) will extend beneath the structures on the north and west sides to dissipate wave energy before it reaches the moorage basin.

Moorage will be provided on two main floats (north wave attenuator and south walkway float) with associated finger floats. The new floats will use heavy- walled, high-density, rotationally molded polyethylene and/or concrete enclosures for the flotation billets to prevent the release of foam into the environment. The fuel docks will use concrete enclosures. The finger floats also will be constructed with heavy-walled, molded polyethylene-encased foam billets. The finger piers will be approximately 7 feet wide with timber wales used to tie together the float sections. Approximately 36, 16-inch-diameter steel pilings will be used to secure the finger piers. An additional 14, 16-inch-diameter galvanized steel pilings will be used to secure the main piers, which includes the loading zone, and the fuel docks. Two 12-inch-diameter galvanized steel pilings will support a short, fixed pier and a 100-foot-long gangway, which has an 85-foot effective coverage length, will connect the floating piers to the shoreline. An additional 11, 12-inch-diameter galvanized steel pilings will be used to mark the recommended navigation channel in the South

Fairway (berth access area south of the south walkway float) and to protect the north edge of the existing eelgrass beds east of the gangway and along the west property line near the seawall.

The proposed project will add approximately 38,170 sf of floating overwater coverage and approximately 160 sf of fixed-pier overwater structure along the seawall, for a total net increase in overwater coverage of 38,330 sf.

Float construction work will occur off site, with rafting and hand assembly on site as pile driving is completed. The pile driving will be performed from a derrick barge with an air impact hammer. A boom will be deployed around the construction area to contain any floating debris and construction equipment lubricants that may accidentally enter the water. Any debris that accidentally enters the water will be contained by the floating boom and cleaned out of the water immediately. Pile driving will take approximately 2 weeks (i.e., 10 to 14 working days based on an estimated pile-driving rate of 8 to 10 piles per day). Float assembly will occur concurrently with pile driving, take approximately one month, and be complete within approximately one week after pile driving is completed. The proposed starting date is as soon as possible after the appropriate "fish window(s)" opens. (NOTE: Ideally, construction will occur between July 15 and September 15 to take advantage of the summer weather and relatively light wind and wave conditions at the site.)

4. Shoreline Improvements

An existing seawall protects the shoreline at the western end of the project site. Originally constructed in 1907, the seawall is badly deteriorated below the ordinary high water (OHW) mark (9.65 feet above mean lower low water [MLLW]). Approximately 600 cubic yards (cy) of riprap and clean structural fill will be placed along the toe of the existing vertical bulkhead to provide needed support and protection. The riprap will be placed at a slope of 1.5 to 1 from approximately MLLW to +7.6 feet MLLW (Sheets 3, 7, and 8). The placement of fill and additional riprap will occur during low tides to minimize water quality impacts. All of the seawall repair work will be done during the allowed fish window to minimize impacts on migrating juvenile salmonids. Repairs will begin as soon as possible after the appropriate fish window(s) open.

The remaining shoreline east of the seawall is partially armored with riprap consisting of concrete rubble and large granite boulders. The riprap does not adequately protect the bank from being undermined or from sloughing above OHW. A vinyl sheet-pile bulkhead will be installed behind the existing top of bank to prevent continued erosion (Sheets 3, 7, 9 and 10). Broken concrete rubble in the intertidal zone will be removed and replaced with a layer of rocks and cobbles consistent with the existing character of the beach (Sheet 9). Scattered 6- to 8-inch cobbles will be placed over disturbed portions of the beach to mimic the existing mixed-fine habitat type. The beach contours below about +6.0 feet MLLW will be maintained. The existing riprap coverage along the eastern portion of the shoreline is more extensive. The existing riprap slope will be repaired or maintained above OHW and a habitat fill of minus 2-inch mixed sand and gravel will be applied across the entire riprap slope (Sheets 9 and 10). Anchored drift logs and suitable riparian vegetation will be planted along the base of the vinyl sheet-pile bulkhead and between the top of the bank and the proposed public access footpath.

6. Upland Facilities

Shore facilities will include two levels of covered parking, with a two-story office building for water-dependent and water-oriented businesses on the upper level (Sheets 2 and 7). Maximum building height will be approximately 50 feet above ground level (approximately +15 feet MLLW at the building site). The building footprint will be 27,810 sf, including 15,380 sf of covered parking. A private road and outside parking area will cover an additional 14,900 sf. Surface-water runoff from parking lots and road surfaces will be collected in catch basins and directed to a water quality vault for treatment. Treatment will include sediment filtration and oil-water separation in the vault. Treated runoff will be discharged to a City of Anacortes outfall that will discharge into a deep catch basin to dissipate energy, then onto the riprap slope in the upper intertidal zone (Sheet 8). Roof runoff, which does not require treatment, will be collected and routed to a separate outfall located near the site of the existing City of Anacortes outfall at the western end of the proposed sheet pile wall (Sheet 7).

8. Best Management Practices

All Washington State Department of Ecology (Ecology)-required best management practices (BMPs) and spill controls will be used during construction to minimize the possibility of release of petroleum products and construction debris. No inwater construction will take place during salmonid migration periods as stipulated by the Washington Department of Fish and Wildlife (WDFW). On completion of the project, all Ecology-required BMPs and spill-control procedures will be followed during marina operations. Trained personnel will staff the fuel concession operation and will have access to the required spill-containment equipment. A spill-response plan will be drafted and implemented in the event of a spill during fueling or other marina operations. The public-access sewage pump-out service at the fuel dock will also be staffed by trained personnel.

10. Vegetation Enhancement

Because there is a potential that the shading described below may result in a decrease in productivity of macrovegetation at the site, the project includes a vegetation enhancement program that will be initiated upon receipt of project permits. This vegetation enhancement program will have three elements described in detail in Section 6.0:

- Kelp substratum enhancement;
- Marsh vegetation enhancement; and
- Riparian vegetation enhancement.

12. Avoidance and Minimization

The proposed design of the marina has been modified substantially to avoid or minimize potential impacts to aquatic resources. The majority of the marina facilities will be located off shore and in relatively deep water (greater than −18 to −22 feet MLLW) to avoid impacts to eelgrass, to minimize impacts to macrovegetation, and to preserve the nearshore migration corridor for juvenile salmonids. The vertical bulkhead that now occupies the shoreline of the site will be faced with sloped riprap, and gravel will be applied to fill the interstices of the riprap to improve the nearshore migration corridor. The widths of breakwaters, docks, and floats have been minimized to reduce the extent of shading.

All project structures have been located to avoid direct shading of eelgrass. Following initial design and environmental evaluation, the fuel dock was relocated to maximize separation between the eelgrass bed and vessels maneuvering to approach the dock. The Applicant will install a line of nine 12-inch pilings approximately 5 feet from the existing eelgrass beds on the east side of the marina and two more on the western side of the fuel dock as a warning and barrier to boat operators to keep them from operating vessels over the beds. The pilings will be painted with red and white vertical stripes, the universal Coast Guard coloring system for navigation aids, to warn boaters not to pass between the piles and the shoreline. Signs explaining the purpose of the pilings will also be installed on the outer pilings.

Fuel-spill response equipment will be located on the fuel dock to contain and clean up any spillage. The marina will be constructed with steel pilings and polyethylene and/or concrete enclosures for the flotation billets to eliminate any potential for hydrocarbon leaching that would otherwise result from use of creosote-treated wood. Stormwater management and spill control contingencies all reflect the most recent BMPs recommended by Ecology and the City of Anacortes.

14. Existing Conditions

The existing marine intertidal habitat and associated species have been described in detail in the project BE. Eelgrass and macroalgae were mapped using an underwater video mapping system in summer of 2000 (Pentec 2001), and more quantitative vegetation surveys were conducted by divers and intertidal biologists in summer of 2001 (Nelson 2001a,b). In summary, the uppermost shoreline is bulkheaded (western portion) or riprapped (eastern portion) for bank protection. The upper intertidal zone is thus either vertical concrete bulkhead (western portion, extending to about MLLW), or relatively steeply sloped riprap and concrete rubble (eastern portion, extending to about +3 to +6 feet MLLW). The middle intertidal beach on the eastern portion of the site is composed of cobbles embedded in coarse sand and gravel but supports a more productive epibiota of barnacles, mussels, crustaceans, and assorted algae. The lower intertidal zone across the site becomes increasingly fine-grained, although cobbles and small amounts of broken concrete debris are present.

The vertical concrete seawall limits the area available as a shallow-water refuge for salmonids during high tide. Wave reflection from the seawall has resulted in a relatively bare patch of scoured sand, shells, and debris (approximately 1,200 sf) at the base of the seawall. Infauna is minimal in this material due to its frequent disturbance and the coarse nature of the substrate. This bare area varies in width, from 5 to 10 feet, along 140 feet of the north face of the seawall and narrows to the west as the beach elevation declines and to the east where the number of cobbles and larger items of concrete debris increases. These larger, more stable, substrates support relatively dense cover of macroalgae, primarily *Ulva*, *Enteromorpha*, and *Mastocarpus* (Nelson 2001b).

Two small, isolated patches of eelgrass are found at about +1 foot MLLW on the eastern side of the site, and a larger eelgrass bed is present in the southeast quadrant of the Harbor Area, between about −1 and −12 feet MLLW, extending across the eastern portion of the site to near the vicinity of the existing dolphin, approximately 40 feet east of the gangway and ramp leading from the upland portion of the site to the marina floats. The distribution of eelgrass and the two dominant types of macroalgae (laminarians and ulvoids) are shown on Sheet 3.

Diving surveys (Nelson 2001a) confirmed the distribution and abundance information provided by the video survey. Nelson reported that a fine silt substrate appeared to be responsible for the lack of macroalgae along the central and western portion of the South Fairway. Scattered cobbles under and just east of the outer portion of the proposed gangway location supported laminarians and an understory of green and red algae. Cover was limited, however. In the area under the proposed south walkway float, *Laminaria saccharina* and *Agarum cribrosum* averaged 22.1 and 10.7 percent cover, respectively, in 1.0-m^2 quadrats (Nelson 2001a). These laminarians were highly substrate dependent, however, with much greater coverage where hard substrates were present and virtually none where the substrate was silt. Total area of patches of relatively bare substrate (unhatched on Sheet 3) within the project boundaries is about 42,000 sf. Coverage and diversity of laminarians and red algae was relatively high in the area under the proposed north wave attenuator location where the substrate was more uniformly cobbles and boulders. In addition to *Laminaria* and *Agarum*, the laminarians *Pterygophora californica* and *Pleurophycus gardneri* each contributed significant coverage (Nelson 2001a). Average percent algal cover on Nelson's Transect 5.5, in the vicinity of the north wave attenuator, was 41 percent (S.D. 35 percent; range 0 to 110 percent) with cover very dependent on presence of cobbles or boulders.

Fish populations at the site area have not been sampled but are expected to be similar to those in similar habitats in the northern portion of Puget Sound. Guemes Channel is known to be an important migration corridor for juvenile salmonids outmigrating from the Skagit and Samish rivers through Padilla and Fidalgo bays. Eelgrass beds are known to comprise important habitat for juvenile salmonids, including threatened chinook salmon. No forage fish use of the area has been documented, but herring spawning in Fidalgo Bay may pass by the site, both as larvae and adults.

16. impact Analysis

Impacts of project construction and operation have been detailed in the BE. In summary, project construction will result in destruction of small and isolated local areas of marine benthic habitat and species in areas in the footprint of each piling. Short-term disturbance of fish fauna may result from pile driving and work boat activity during marina construction. During project operation, additional short-term disturbance of fish fauna may result from boat movements to and from the facility.

2. Shoreline/Intertidal Zone

Placement of riprap along the lower face of the vertical concrete bulkhead will cover about 4,300 sf of existing, mostly wave-disturbed mixed sand and gravel, or cobble bottom at elevations ranging from about MLLW to about –2 feet MLLW (Sheets 3 and 8). It will also cover about 2,800 sf of the existing east- and north-facing concrete bulkhead. Because of the complexity of the rock surfaces, placement of riprap will actually increase the surface area available for attachment of epibiota. The riprap will be colonized by species of algae and epifauna similar to those now inhabiting rock, rubble, and the concrete bulkhead at similar elevations. Interstices of the riprap will be filled with a 2-inch minus habitat mix of rounded sand and gravel to increase moisture retention and promote production of epibenthic zooplankton. The reduced slope of this shoreline (1.5h:1v) and the increased availability of epibenthic prey will significantly improve the nearshore migration corridor available for juvenile salmonids along this western portion of the project site.

Debris removal, reduced substrate sizes, and planting of marsh and riparian vegetation along the eastern portion of the site (Sheets 9 and 10) will also significantly improve the nearshore migration corridor available for juvenile salmonids along the eastern portion of the project site.

Thus, the proposed project will result in no net loss of littoral habitat area and will provide a net gain in the quality of the nearshore migration corridor available to juvenile salmonids.

4. Subtidal Zone

Presence of the marina and on-shore facilities will shade portions of the adjacent beach and subtidal bottom areas. A detailed analysis of the area and extent of shading impact that will result from overwater structures has been provided in the BE. Based on this analysis, the shadow of the facility will move constantly through each day and no eelgrass will be directly shaded between March 21 and September 21. With placement of protective pilings to isolate eelgrass from vessels that use the marina, it is expected that there will be no adverse effect on eelgrass from project construction or operation.

The shadow of the overwater structures ranges in size from 0.55 to 0.71 acre at any given time (Supplemental Shading Analysis; Appendix D). Approximately 17,400 sf (0.4 acre) of new overwater structures wider than 8 feet will be added by the project over areas that currently support substantial quantities of macroalgae. Less than 0.2 acre of bottom will remain shaded for the 4-hour midday period between March 21 and September 21. Of this area, more than 78 percent lies in water deeper than –22 feet MLLW where algal growth appears to be limited by lack of suitable substrata. Only a very small area (less than 400 sf) of bottom will be continually shaded at midday shadow throughout the summer. This area occurs under the main access pier at the foot of the gangway where the relatively shallow water depth (i.e., –6 feet MLLW) would limit the degree of sunlight penetration under the structure. To reduce shading impact, the pier will include grating over at least 25 percent of its area from –6 to –10 feet MLLW.

18. Project Area Enhancement

2. Intertidal and Riparian Enhancements

Repair and shoring of the vertical bulkhead will require placement of riprap along the lower face of the bulkhead. To ensure that the nearshore migration corridor for juvenile salmonids is improved as a result of this project, the Applicant proposes to add a habitat mix of 2-inch-minus rounded sand and gravel to fill the interstices of the riprap and to provide substantial improvements to the shoreline of the eastern portion of the site.

An approximate 750 sf area of the shoreline along the eastern portion of the site between approximate elevations of +7 feet and +9 feet MLLW will be provided with a substratum that is a mix of 2-inch-minus sand and gravel with a limited number of 6- to 8-inch cobbles. This area will be sheltered from direct waves from the north and west by marina structures, but will be exposed to some wave action from the east; hence the inclusion of gravel and a limited amount of larger cobble in the substratum to ensure its stability during the period while plants are becoming established. This area will be planted with saltmarsh plants tolerant of conditions along Guemes Channel. These are likely to include *Salicornia virginica, Distichlis spicata*, and *Deschampsia caespitosa*. Plantings will be on 30- to 50-cm centers.

Riparian plantings will be made along the eastern shoreline as permitted by elevations and available space (Sheets 7 and 9). Herbaceous plants between OHW and the sheet pile bulkhead may include dune grass (*Elymus mollis*), beach pea (*Lathyrus japonicus*), and big-head sedge (*Carex macrocephalus*). Trees and shrubs planted along the public access walkway may include vine maple (*Acer circinatum*), shore pine (*Pinus contorta*), Nootka rose (*Rosa nutkana*), salal (*Gaultheria shallon*), and Oregon grape (*Mahonia* sp.).

4. Macroalgal Enhancement

The shading analysis conducted for this project did not conclusively show that there would be a loss of macrovegetation (e.g., eelgrass, macroalgae, saltmarsh) productivity or area in the project vicinity. However, some reduction in algal productivity may occur in areas that receive repeated shading from marina structures, particularly those greater than 8 feet wide. This hypothesized reduction in productivity is not reasonably predictable; however, to offset any reduction in macrovegetation productivity that may occur, the Applicant proposes to add boulders to a large area of finer-grained substrate to provide conditions for new algal growth. Approximately 17,400 sf of the proposed dock structures that are greater than 8 feet wide will be located over areas that currently support substantial amounts of macroalgae that may be affected by shading. The Applicant proposes to provide approximately 26,000 sf of habitat for attachment of additional algae as a concurrent conservation measure that is expected to more than offset that potential reduction in productivity.

The macroalgal enhancement will occur in sandy or silty areas that currently lack a substratum for algal attachment, yet are in depths generally greater than those supporting eelgrass in Guemes Channel. These areas (Figure 1) lie in water deeper than –16 feet MLLW south of the south walkway float (South Fairway), and under the west end of the south walkway float (West Hole). Boulders will be angular igneous or metamorphic rock and will be sized large enough to be stable on the bottom following kelp establishment and to leave a majority of the rock exposed above the finer-grained surrounding substratum. A size range of 12- to 24-inch diameter is anticipated and could include rock removed from the beach along the eastern shoreline of the site.

Total area shown in Figure 1 where boulder placement could enhance substrate is approximately 42,000 sf. As a concurrent conservation measure, boulders will be spread over approximately 26,000 sf of that area indicated on Figure 1. Boulders will be placed primarily (24,100 sf) in areas that will not be under project structures; the remaining area to receive boulders (1,900 sf) will extend partially under the southern portions of the 50-foot slips on the south side of the south walkway float. Boulders will be spread from a barge that is moved slowly over the area. The objective is to achieve an overall average bottom coverage of rock of 75 percent; however, it is expected that the distribution on the bottom will be highly uneven with aggregations of boulders interspersed with areas of remaining bare substrate. Divers will verify the distribution of boulders achieved and note the depth of penetration of the boulders into the sediments. Additional boulders may be placed, as needed, to achieve the desired distribution or areal coverage. Care will be taken to avoid boulder placement in areas with existing macroalgae or eelgrass, as delineated by the line of pilings along the South Fairway.

It is expected that algal sporelings will become established on the rock surfaces from planktonic gametes, leading to algal cover that equals or exceeds that in existing areas that support kelp beds on the project site. Patches of remaining bare substrate will continue to support crab, flatfish, and other benthos currently found on the site.

20. Monitoring

This section describes a macrovegetation monitoring program that will quantify the marsh assemblages to be established along the eastern site shoreline and macroalgal growth on the bottom of the project area. Monitoring is designed to assure that natural colonization of algae on the boulders placed in the project site at least maintains the present (pre-project) level of production within the first 5 years following project construction. It is assumed that if this condition is met over the first 3 to 5 years (while the new substrate is being colonized), it will be met for the long term.

Stratified quadrat monitoring will be conducted before and following project construction to quantify changes in macroalgal cover and abundance (cover times area) that result from the project and to document colonization of the enhancement substrate. Monitoring will follow a stratified random sampling design with each of two enhancement areas considered to be one stratum that will be used to correct for area wide changes in algal cover that are unrelated to the performance of algae in the impact or enhancement areas.

The Applicant proposes to begin with a substantial area of substrate enhancement that will be placed prior to, or in the early stages of, project construction. This area (approximately 26,000 sf; Figure 1) is about 150 percent of the approximate area of existing algal beds that will be shaded by project structures exceeding 8 feet in width. The Applicant will then monitor losses that may occur in the project stratum (corrected by any changes in the reference stratum) and gains in the conservation measure (for brevity called the "enhancement") stratum (less algae present in areas before placement of boulders).

2. Baseline Monitoring

The initial step in the baseline monitoring was a detailed video mapping of the pre-project macrovegetation distribution in the project vicinity, conducted in August 2000 (Pentec 2001). This survey was conducted with the Pentec ***Sea-All™*** video mapping system, which provides a concurrent differential global positioning system (DGPS) georeferencing of resource distributions. The survey was controlled to provide accurate positioning in relation to project structures and local bathymetry.

Mapping was conducted in the area from 200 feet east to 100 feet west of the marina to locate areas where eelgrass or kelp beds can be established or enhanced if compensation is needed for project-related effects. Additional baseline surveys were conducted (Nelson 2001a,b)—intertidal surveys of the north face of the vertical concrete bulkhead and adjacent beach areas (Nelson 2001b), and subtidal diving transect surveys in areas that will be shaded by the marina (Nelson 2001a)—to define pre-project macrovegetation species composition and percent cover. Sampling design has been set up to follow WDFW guidelines that call for establishment of transects down the centerline, and 20 feet from the centerline parallel to the centerline of proposed structures. The exception is the east–west oriented North Wave Attenuator; here, the transects are under the centerline, and 20 and 40 feet north of the centerline. Potential sample points are then identified at 20-foot intervals along each transect, resulting in a 20-foot by 20-foot grid pattern (Figure 1). Actual points to be sampled will be randomly selected from these potential sample points.

Based on the strata defined above (i.e., project, enhancement, and reference), the following plots will be established for quantitative baseline monitoring (Table 1; NOTE: enhancement stratum plots will be monitored for algal presence prior to placement of enhancement boulders):

- Project stratum (Note: plots in this stratum extend 12 to 30 feet beyond structure boundaries to encompass possible lateral shading)

    - Promenade and fuel floats (P1-PR; depths between about –6 and –14 feet MLLW; approximate area 5,600 sf)

    - West Breakwater (P2-WB; depths between about –14 and –20 feet MLLW; approximate area 6,400 sf)

    - East Breakwater North (P3-EBN; depths between about –14 and –20 feet MLLW; approximate area 3,200 sf)

    - East Breakwater South (P3-EBS; depths between about –14 and –20 feet MLLW; approximate area 3,200 sf)

    - North Breakwater (P4-NB; depths between about –21 and –23 feet MLLW; approximate area 18,200 sf)

- Enhancement stratum (Note: plots in this stratum will be randomly located to fall within the areas receiving boulders)

    - South Fairway (M1-SF); depths between about –18 and –20 feet MLLW; will include areas under finger floats; approximate area 20,600 sf)

    - West Hole (M2-WH); depths between about –14 and –20 feet MLLW; will include area under finger floats; approximate area 5,400 sf)

- Reference stratum
  - Shallow Reference (R1; depths between about –14 and –18 feet MLLW; approximate area 3,600 sf)
  - Deep Reference (R2; depths between about –20 and –23 feet MLLW; approximate area 3,600 sf)

All sampling will be done between June 1 and July 31 in each sample year.

Within each of the eight plots defined above, transect line origins will be established by DGPS and permanently marked to allow relocation. Sample points will be randomly located along each transect line during the initial survey and the same sample points will be relocated and resampled in subsequent surveys. The number of sample points allocated to each plot (Table 1) is weighted by area. Proportionally more sample points will actually be sampled in smaller plots but, overall, nearly 50 percent of the potential sampling points will actually be sampled.

Estimates of algal percent cover (by species or major taxon) will be made in 1.0-m^2 quadrats placed at each sample point so that the sample point is at the southwest corner of the quadrat. Percent cover of each taxon will be a visual estimate of the percentage of the quadrat occupied by the taxon. Where one taxon overlays another, cover estimates will be made separately for each layer so that the total cover may exceed 100 percent. Shoot counts will be made of any eelgrass encountered; however, these plots are largely below the maximum depths for eelgrass in Guemes Channel or lack eelgrass for other reasons.

2. Post-Construction Monitoring

Post-construction monitoring of subtidal macrovegetation will be conducted during the summer of Years 1, 3, and (if needed) 5 following project construction to document any reduction in algal cover that has occurred as a result of the project and to document the extent of colonization of the enhancement boulders. Post-construction monitoring will be conducted, which will consist of repetition of the diver quantification of macrovegetation in eight plots in three strata, as described above for the baseline survey.

The beaches planted with marsh plants near mean higher high water along the eastern portion of the site will be monitored to determine the success of saltmarsh plantings. A tape will be laid along the area of shoreline that was planted. The width of the zone of beach supporting salt tolerant vegetation will be recorded at 15 randomly selected locations along the tape. A cross transect will be laid at each of these points and a randomly-selected distance selected to define the corner of a 0.25-m^2 quadrat. Percent cover of all salt-tolerant vegetation will be recorded in each quadrat. This sampling will be conducted in late summer of the Years 1, 3, and 5 following construction.

34. Objectives/Performance Standards

No performance criteria are established for Year 1 monitoring. The overall objective of the conservation plan is that there be no net long-term loss of macroalgal cover as indicated by the Year 3 or Year 5 data. Achievement of this objective will be measured in two steps as follows.

2. Statistical Testing

In this sampling design, the areas of the various plots are fixed and therefore have no variance associated with them. A simple randomized t-test can thus be used to test the following null hypotheses:

H_o1 Mean cover (percent) of macroalgae (or any taxonomic subset of macroalgae) in any project plot is not significantly lower following construction (Year 1, 3, or 5) than it was before construction (Year 0 baseline).

Note: The wording of this hypothesis allows use of a 1-tailed t-test with associated increase in power to detect significant differences, should they exist. If H_o1 is accepted, then project structures have not resulted in a significant decline in the macroalgal cover, given the limitations of the sampling design. If H_o1 is rejected, then further analyses are required (normalization of project plot cover to changes in the reference plots and retesting).

H_o2 There is no difference in mean cover (percent) of macroalgae (or any taxonomic subset of macroalgae) between plots in the project stratum (those areas potentially affected) and the plot in the reference stratum at the comparable depth.

Note: This wording requires a 2-tailed t-test. If H_o2 is accepted *for both pre-project and post-project conditions*, then project structures have not resulted in a significant decline in the macroalgal cover, given the limitations of the sampling design. If H_o2 is rejected for either pre- or post-project conditions, then further analyses are required (normalization of project plot cover to changes in the reference plots and retesting).

H_o3 Mean cover (percent) of macroalgae (or any taxonomic subset of macroalgae) in enhancement plots is not significantly less than that at the comparable depth plot in the reference stratum.

Note: This wording allows use of a 1-tailed t-test. If H_o3 is accepted, then establishment of macroalgae in the enhancement boulders has reached a level comparable to that on nearby natural substrates. This test does not trigger a specific action but informs us regarding the progress of colonization of the boulders.

The power of data from the site to detect significant differences when they exist, the probability (*alpha*) of incorrectly rejecting the null hypothesis when it is true (Type I error), and the probability (*beta*) of incorrectly accepting the null hypothesis when it is false (Type II error), will be calculated based on pre-project baseline data. The results will be discussed with WDFW to see if changes in replication are necessary before post-project sampling is conducted. For the purposes of this conservation plan, we would like to minimize Type II error, the risk of concluding that the project has not had an effect when, in fact, it has. This will be accomplished by using an *alpha* of 0.05. Cover of annual green algae (e.g., ulvoids) and certain annual filamentous brown algae (e.g., *Pilayella*) may be eliminated from calculations of project performance with the concurrence of WDFW.

If H_o1 is accepted, then project structures have not resulted in a significant reduction in macroalgae. If H_o1 is rejected, then further analysis will be conducted: If H_o2 is accepted for both pre-project and post-project conditions, then it can also be concluded that project structures have not resulted in a significant reduction in macroalgae. If both are rejected (H_o2 for either pre- or post-project), then additional analyses will be required to examine whether presence of the project has resulted in a decrease in macroalgae that exceeds the increases in macroalgae on the enhancement boulders. This will be done using the numerical comparison approach described in the following section.

4. Numerical Comparisons

If the project has had a significant adverse effect on macrovegetation in the project stratum (Section 7.2), simple numerical comparisons will be used to determine if the gain in macroalgal cover in the enhancement stratum equals or exceeds those losses. Mean cover (percent) of each stratum (project and enhancement) will be multiplied by the area of the stratum represented (Table 1) to determine algal abundance (percent-area).

- Gain in macroalgal abundance in the enhancement stratum will be calculated by subtracting the baseline abundance (corrected by any change in reference stratum algal cover from the baseline to the year in question) from the abundance in the year in question.

- Loss of abundance in the project stratum will be calculated by subtracting the post-project abundance in any given year (corrected by any change in reference stratum algal cover from the baseline to the year in question) from the abundance in the baseline year.

- The Year 3 or Year 5 objective is that the net gain in algal abundance in the enhancement stratum equals a minimum of 100 percent of any loss of algal abundance in the project stratum. An additional 10 percent is applied in decision making after Year 3 to account for additional uncertainty regarding the trajectory of colonization of boulders in the enhancement stratum.

Early colonization of the enhancement substrate is expected to be rapid in the first few years following placement. Because of the annual growth patterns of macroalgae and their rapid responses to reduced light levels, it is assumed that any loss of macroalgae due to shading will be fully realized by Year 3. Also, the algal community may not be a fully mature by Year 3 or 5 (e.g., Houghton et al. 1997, Driskell et al. 2001). Therefore, it is expected that if gains in the enhancement stratum have reached 110 percent of any losses in the project stratum by Year 3, or 100 percent of any losses in the project stratum by Year 5 (corrected for any change in reference stratum algal cover), the objective of no net loss will be fully met in the longer term. Algal growth expected to occur on project floats and pilings will add to the post-project macroalgal productivity in the project area but is not included in this calculation.

39. Reporting

Annual monitoring reports will be prepared by August 31 of each monitoring year. Reports will detail the monitoring conducted, results obtained, statistical tests run, and conclusions reached. Planned future activities (e.g., monitoring, additional enhancements, etc.) will also be described. Reports will be submitted to WDFW, Ecology, Washington State Department of Natural Resources, U.S. Army Corps of Engineers, the National Marine Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (USFWS).

41. Contingency Plans, Adaptive Management, and Bonding

Year 1 and 3 data will be used as an indication of the trends in site vegetation. No mandatory additional conservation measures will be required on the basis of Year 1 or 3 data. However, the Applicant may elect to expand the pre-project enhancements on the basis of these data. If Year 3 data indicate that there has been a net gain in macroalgae in the project area (net gain in the enhancement stratum exceeds net loss in the project stratum) by more than 10 percent, Year 5 monitoring will be waived. A net gain of more than 10 percent is defined as the condition where algal abundance (area times mean percent cover) in the enhancement stratum (Year 3 abundance minus baseline abundance, corrected for changes in reference stratum) exceeds macroalgal reductions in the project stratum (Year 3 abundance minus baseline abundance, corrected for changes in reference stratum) by more than 10 percent. Since the macroalgal development on the boulders placed for enhancement may not be fully mature in 3 years and would be expected to continue to increase, it can be expected that, if this condition is met at Year 3, it will be met in perpetuity.

If Year 5 post-construction monitoring indicates that there is a net loss of macroalgal abundance, additional macroalgal enhancements will be provided as described above in additional areas identified by the Applicant and approved by WDFW, NMFS, and USFWS. Alternatively, a similar level of effort/cost will be expended by the Applicant to accomplish another type of enhancement action, approved by WDFW, NMFS, and USFWS, which will provide similar benefits to the resources impacted by the project. A net loss of macroalgal abundance (area times mean percent cover) will be considered to have occurred if algal abundance in the enhancement stratum (Year 5 abundance minus baseline abundance) is less than 100 percent of macroalgal reduction in the project stratum (Year 5 abundance minus baseline abundance).

If after any year of monitoring there is reason to believe that the initial substrate enhancement is not likely to meet to the success criterion of no net loss, the Applicant may elect to provide additional macroalgal enhancements as described above in additional areas identified by the Applicant and approved by WDFW, NMFS, and USFWS. These areas would preferably be on or adjacent to the project site, in an area leased from the Washington Department of Natural Resources.

If the overall objective of no net loss of macroalgal productivity is not met at Year 5 and additional conservation measures are required, biannual monitoring will continue until the objective is met.

The Applicant will establish a $100,000 performance bond to be surrendered to WDFW in the event that the Applicant fails to meet the performance criteria described above or to take the contingency efforts described in this section. This bond amount is based on the following anticipated enhancement tasks:

- Rock placement $35,000 (Year 0)
- Project monitoring $10,000/year (Years 1, 3, 5)
- Reporting $5,000 (Years 1, 3, 5)
- Contingency reserve fund $20,000
- Total performance bond $100,000

Once rock placement has been completed and verified by the post-placement diver survey, the initial $35,000 portion of the bond will be released. Following WDFW acceptance of the annual monitoring reports for each of Years 1, 3 and (if required) 5, an additional $15,000 of the bond will be released. Upon WDFW acceptance that the criterion of no net loss (Section 8) has been met (Year 3 or Year 5), the remainder of the bond will be released. Upon surrender of this bond, the Applicant is released from all obligations under the plan described in this document.

48. References

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